

## Friends of Mineralogy, Colorado Chapter Newsletter – January 2017

**January Meeting – Thursday, Jan. 12, 7:30 pm** Board meeting 6:30-7:30 p.m., **Denver Museum of Nature and Science – VIP Room** Enter the Museum through the Security/Staff entrance to the left of the main entrance.

### *Minerals of the Leonard Mine, Butte, Montana*

*by Michael J. Goble, P.E.*

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**Mike Goble**, a professional geotechnical engineer, works for the U. S. Bureau of Reclamation, Denver CO. Mr. Goble has worked for the past 20 years designing mine closure and dam rehabilitation projects. His project accomplishments include closure designs for the Summitville Mine Superfund Site in Colorado, the Crystal Mine in Montana, Gilt Edge gold mine in South Dakota and others. His industry experience includes coal, uranium, and precious metals mining operations in Colorado and Montana. As an engineer with the U.S. Bureau of Mines he researched innovative mine closure methods. Mr. Goble graduated from the Colorado School of Mines in 1976 with a B.S. in Mining Engineering. In 1991 he earned an M.S. degree in Mining Engineering from New Mexico Tech.

Mike's hobbies as a mineral collector including micromounts and gem cutter date back to high school in New Jersey. He has a significant Franklin and Sterling Hill mineral collection and worked as a weekend volunteer in construction activities to help establish the Sterling Hill Mining Museum. For the past 35 years he has specialized in collecting Montana minerals and gemstones along with stock certificates, pictures, and postcards from historic Montana mines. He currently has in review by the Montana Bureau of Mines and Geology, the book, *Minerals of Montana*, and has previously published a Montana Locality index in **Rocks & Minerals** in 2012. He last spoke to Friends of Mineralogy, Colorado Chapter in March 2006 on Minerals of Montana.

# Minerals of the Leonard Mine, Butte, Montana

By: Michael J. Gobla, P.E.

The Leonard mine at Butte is a world renowned mineral locality that has produced prolific amounts of crystal specimens. It is known for well-crystalized specimens of copper minerals including several rare mineral species and is a co-type locality for two minerals new to science colusite and djurleite. As a copper mine it was an economic powerhouse providing some of Butte's richest copper ores during 83 years of mining operations. The principal ore minerals were chalcocite and enargite with lesser amounts of covellite, bornite, colusite, digenite, and djurleite. Developed in 1890, the mine became known for producing copper minerals. By the 1950's the mine was famous for producing prolific quantities of crystalized enargite, pyrite, and quartz along with occasional finds of crystals of over a dozen other mineral species. The specimens were brought in the miners lunch boxes and sold for extra income. The Anaconda company called it "a mineral collectors paradise" (Miller, 1973). In August, 1974, the company entered the mineral specimen business by employing geologist Duane Johnson to collect mineral specimens from the underground mines at Butte and place them in the specimen market for sale.

The Butte ores formed as a disseminated copper-molybdenum porphyry deposit. The upper deposit was fractured and massive quartz-pyrite veins formed due to hydrothermal action (Rusk, 2008). The veins, called "Main Stage" mineralization (Sales, 1914), are east-west trending mineralized fissures up to 100 feet wide. The world had never seen such massive veins filled with high grade ore. Butte became known as the as "The Richest Hill on Earth" as it dominated world copper production (Weed, 1912). In the areas near the Leonard mine, a series of closely spaced southeast striking fractures formed and were also filled by the Main Stage mineralization. In some areas the fracturing and splitting of the veins was so intense that it became known as the "horse tail zone" because the trace of the many veins on mine maps resembled the many parallel hairs in the tail of a horse (Sales, 1914). The Leonard and adjacent mines exploited these rich ores.

There were two Leonard mines at Butte and neither mine was associated with the nearby Leonard claim which was a smelter site. The original Leonard mine was later referred to as the old Leonard when a new shaft and mine plant were developed in 1906. Being outfitted with the largest and finest equipment (headframe, hoist, and pumps), the new Leonard mine became the principal shaft from which nearby mines such as the Minnie Healey, East Colusa, West Colusa, Tramway, and many others were worked as the other mine shafts were abandoned.

The Leonard mine and the smelter claim were named after Butte's Silent Copper King, Mr. Leonard Lewisohn. Butte's three famous Copper Kings, Marcus Daly, William Clark, and Augustus Heinze, were flamboyant and involved in bitter economic and political fights. Although Leonard Lewisohn is not as well known, he and his younger brother Adolph had as much control of rich Butte copper mines and a far greater influence in the United States copper industry than the famous Copper Kings.

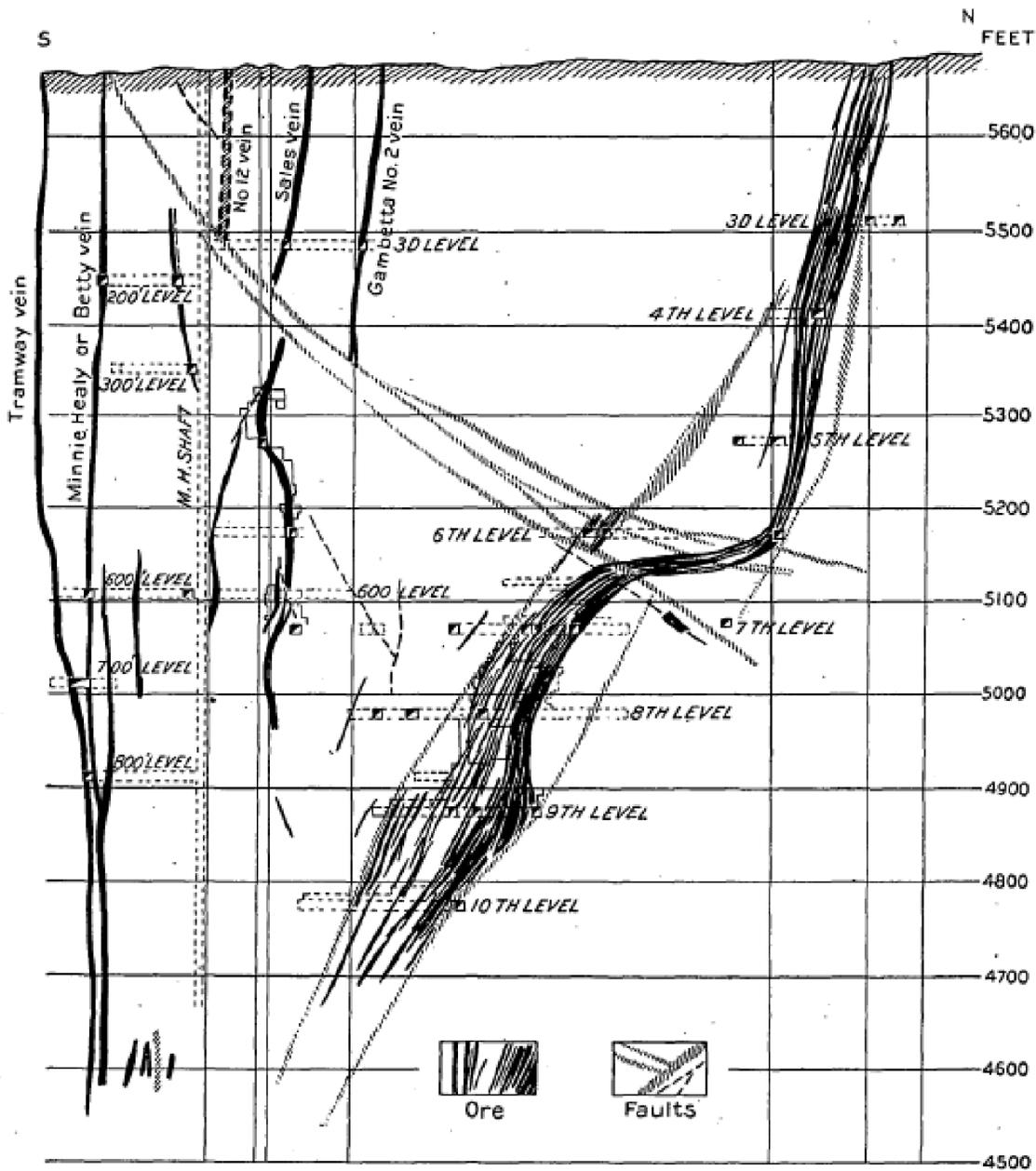


Figure 1. Cross section through the Leonard and adjacent mines (Weed, 1912).

Leonard Lewisohn was born on October 10, 1847 in Hamburg Germany. In 1865 Leonard joined his older brother Julius in New York City to represent the family business as merchants selling feathers, wool, bristles, and horse hair (Engineering and Mining Journal, 1891, p. 383). In 1867 younger brother Adolph left Germany to join the firm of Lewisohn Brothers. The firm was invited to speculate in the purchase of some lead ingots which they later resold at a good profit. Their trading of metals grew to include copper and zinc. By 1878 they were earning large profits from trading copper, the metal of the growing electric age. In 1878 they sent Charles T. Meader to Butte to look for investments in copper mining.

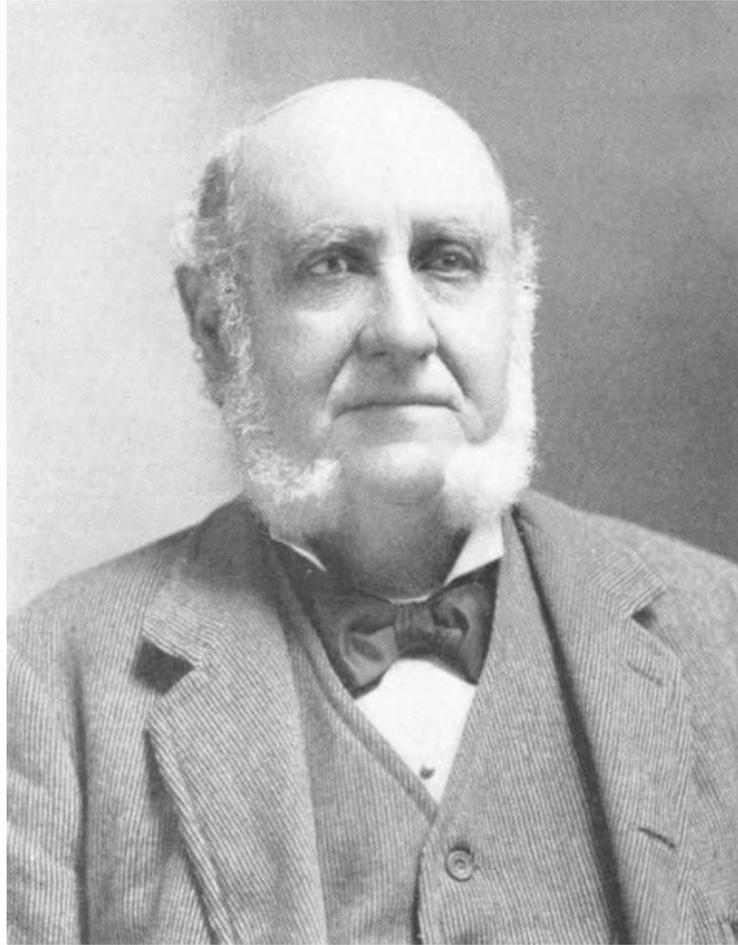


Figure 2. Charles T. Meader came to Butte in 1878. The Leonard mine is located in the former Butte suburb of Meaderville which was later consumed by the development of the Berkeley Pit.

Meader, a forty-niner, had successfully built a copper smelter in California. He purchased a number of mining claims including the Silverite which was renamed the Colusa. Initial operations in 1879 were under the name of the New York Copper Company. Meader sold out his interest giving full control to the Lewisohn Brothers. In 1880 the Montana Copper Company was formed with Meader as manager and Leonard Lewisohn as president of the company.

With \$75,000 capital investment, construction of the Montana smelter was initiated on the Leonard claim in 1880. The smelter initially treated 30 tons per day and was profitable from the start. A new Butte enclave grew up around the smelter that became known as Meaderville. Once the operation was smoothly running, Mr. Meader left the company to develop the Bell mine that he purchased for \$100,000.

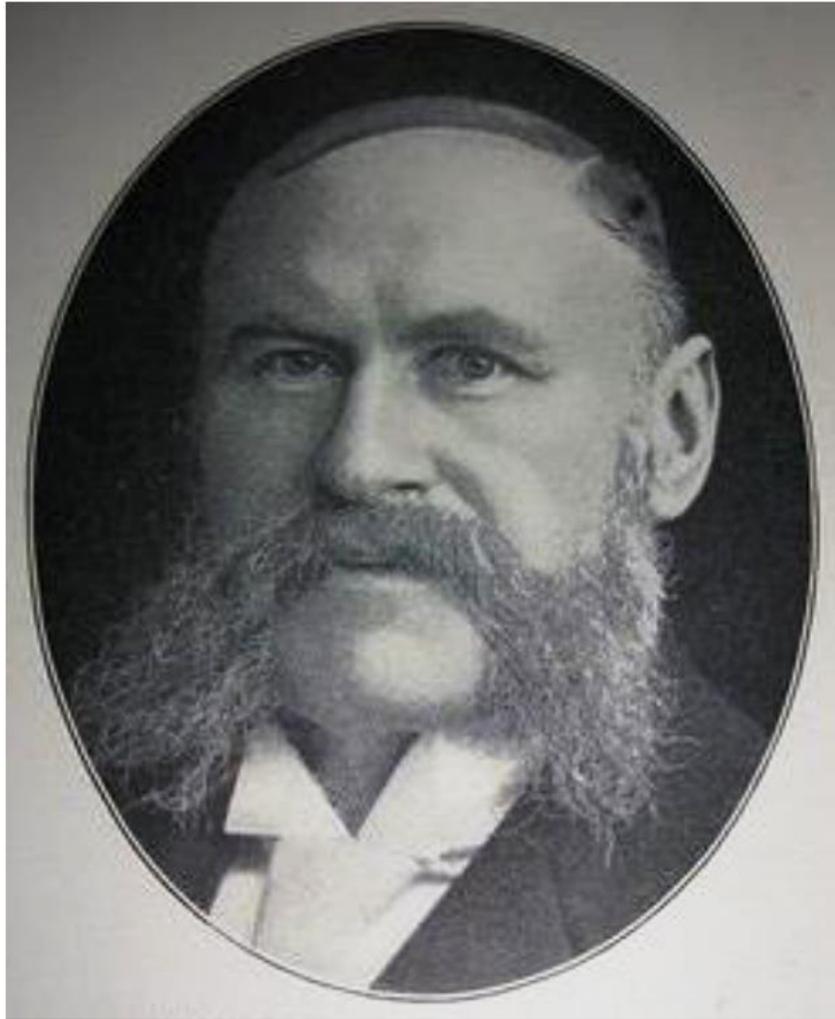


Figure 3. Leonard Lewisohn, Butte's Silent Copper King was the economic force behind development of the Leonard mine and the Great Falls smelter.

The Montana Company was reorganized in 1887 as the Boston and Montana Consolidated Copper and Silver Mining Company with a capitalization of \$3.75 million. Mr. A. S. Bigelow of Boston joined his capital with the Lewisohn's properties to form the second largest copper producer in Butte. Clark's Colusa mine and smelter were purchased along with many other mine claims from other parties including the Piccolo. The West Colusa mine was developed with a deep shaft. The old Colusa mine then became known as the East Colusa. The Montana smelter was renamed the Boston and Montana's Upper Works.

The Leonard mine was established on the Piccolo claim which was originally located by Mr. J. N. Collins on January 24, 1879. The claim was first worked through a shaft on the Piccolo Discovery vein producing ore for the company by 1888. The Piccolo claim was patented on August 16, 1889. In 1890 a new shaft called the Leonard with a 95-foot tall headframe was developed. The Leonard mine soon became the company's most productive operation outperforming the Colusa.

In 1901 a 1,000 gallon per minute pump, the largest in the district, was installed on the 1,200-foot level of the mine. Lying adjacent to F. A. Heinze's Minnie Healy claim, the Leonard was caught up in the infamous underground warfare associated with the apex litigation at Butte until 1906. Although the Heinze forces battled underground, when the discharge pipes of the mighty Leonard pumps were turned into the Minnie Healy claim, the flooding was so great that Heinze finally gave in and ordered his men to stop the underground sabotage (Sales, 1964).

In 1906 a new shaft was developed further to the east. The "Old Leonard" shaft was renamed the Leonard No. 1 and the new shaft was called the Leonard No. 2 shaft. At the time of its erection, it was the biggest hoisting operation in the district. The steel headframe weighed 346,425 pounds and used a 3,000 hp engine with 1.5-inch diameter steel cable to hoist 5 ton skips. The new shaft provided more ventilation which lowered temperatures in the mine by 20 degrees.

A fire broke out in 1906 on the 1,100 foot level of the Minnie Healy mine due to spontaneous combustion. The fire eventually spread to the 1,300 through the 2,000 foot levels of the Tramway, West Colusa, and Leonard mines and up to the 600 level in the Minnie Healy mine. The fire zones were sealed off using bulkheads, but a huge amount of good ore was abandoned by doing this. The worst day for the Leonard mine was April 24, 1911 when the hoist dropped 14 men 1,500 feet to the bottom of the shaft. Five of the men were killed, the other nine crippled by severe injuries.

In 1912 the No. 2 shaft of the Leonard mine was sunk another 294 feet to a depth of 2,000 feet and the old No. 1 shaft was extended 194 feet to the same level. A new ventilation shaft was sunk to 1,400 feet to provide more air to the workings. About 1 million board feet per month of timber was used to support the underground workings where 522 men worked. Another 383 men worked on the surface of this mine.

In 1917 it was decided to fill the fire zone with mill tailings to extinguish the fire and allow mining to reenter the areas where millions of dollars of high grade copper ore remained. The filling work was conducted by drifting or drilling into the fire zone and pumping in the tailings from the Black Rock mill. The hydraulic filling was one of the more tremendous undertakings in the history of underground mining. The work had to be conducted carefully, blasting near the fire zone was held to a minimum due to the danger of the heat in the rocks setting off the explosive charges prematurely. The water content of the fill had to be drained off and pumped out of the mine so no underground reservoirs of water could collect that might later flood men in underlying workings. About 1,700 tons per day of tailings were being pumped into the Leonard mine. After 5 years the fire was extinguished and over 200,000 feet of diamond drilling had been conducted and more than 4,000,000 tons of tailings had been placed (Rice and Sayers, 1925). The abandoned areas were reopened and mined. Fires eventually returned to portions of the Leonard mine many years later.

The mine remained productive until May, 1958. Low copper prices and declining grades led the Anaconda Company to close the Leonard mine. Workers were shifted to the Mountain Con mine where operations were restarted.

The Leonard mine was re-activated in 1962 for development work, as part of the \$11 million deep mining program which utilized the Kelly shaft for ore hoisting from deep levels. A 1,000 ton per day mining operation was planned for the Leonard. One hundred men were working in the mine; however this was far below the amount of miners needed to replace the production lost from shutting down the block caving operation at the Kelly mine. Anaconda decided on a temporary closure of the Leonard mine and moved the men to the Steward and Mountain Con mines. The company then began a program to recruit men from other mining districts in western United States. In January 1963, the Leonard mine resumed production when an additional 350 contract miners were hired and placed at the Leonard and Steward mines. The men were put on six-day-per-week shifts in order to produce as much copper ore as possible. Mining operations continued until 1967.

The mine was re-opened in January, 1972 to produce 4 % copper ore at a rate of 650 tons per day. On September 18, 1973 the headframe was blasted down to provide room for the expanding Berkeley pit. The underground mine was then accessed from the Kelly shaft. It shut down in February of 1975. With the abandonment and subsequent flooding of the Berkeley Pit, the Leonard mine workings are flooded and inaccessible.

Table 1. Minerals of the Leonard Mine.

Atacamite	Copper	Galena*	Pyrophyllite
Baryte*	Cornwallite	Gold	Quartz*
Betekhtinite*	Covellite*	Gypsum*	Scheelite*
Bornite*	Diaspore	Hinsdalite*	Silver
Brochantite	Dickite	Hidalgoite	Sphalerite*
Calcite*	Digenite*	Hubnerite*	Tennantite*
Chalcanthite*	Djurleite*	Kaolinite	Tetrahedrite
Chalcocite*	Enargite*	Luzonite*	Topaz
Chalcopyrite	Fluorapatite*	Muscovite	Wavellite
Colusite*	Fluorite*	Pyrite*	Wurtzite*

\* Indicates that crystal specimens or microcrystals have been recovered.

References:

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Miller, R. N. (1973) Production history of the Butte district and geological function, past and present. Guidebook for the Butte Field Meeting of Society of Economic Geologists, F1-F10.

Rusk, B. G., Reed, M. H., and Dilles, J. H. (2008) Fluid inclusion evidence for magmatic-hydrothermal fluid evolution in the porphyry copper-molybdenum deposit at Butte, Montana. *Economic Geology*, 103 (2): 307-334.

Sales, R. H. (1914) Ore deposits at Butte, Montana. *American Institute of Mining Engineers Transactions*, 46, 3-109.

Sales, R. H. (1964) *Underground Warfare at Butte*, Caxton Printers Ltd., Caldwell, Idaho, 77 p.

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## President's Message

I hope everyone had a wonderful holiday with friends and family. We are looking forward to a very interesting talk about the Leonard Mine, Butte, Montana at the Friends meeting on Thursday at 7:30 PM, January 12th, by Mike Goble.

This February, at the Tucson Gem and Mineral Show, we encourage all FMCC members to attend the general membership meeting of the National FM. It will be held this year at a slightly different location, in a tent next to the Hotel Tucson City Center, Tuesday, February, 7th, from 4 to 6 pm. This is a chance to be updated on events and activities from all of the FM chapters nationwide. It is also a social event for FM members.

In March I will be representing FMCC at the RMFMS (Rocky Mountain Federation of Mineral Societies) convention to be held in Albuquerque, New Mexico. The convention is being hosted by the Albuquerque Gem and Mineral club during their annual mineral show on March 17th through 19th, 2017. If anyone would like to go and help me represent FMCC please let me know.

I believe we should start the planning process for a FMCC sponsored mineral symposium to be held 18 to 20 months from now. If we start organizing this spring it will give us plenty of planning time for another phenomenal symposium. Thoughts and ideas for our theme, associated activities and field trips would be very helpful.

I am hoping you have all read Dan Kile's disturbing article about the future of amateur (casual) mineral collecting. Many people are concerned about the future of our hobby. I already know of some mining claim owners that are considering postponing or outright canceling field trips to their claims due to the possible repercussions. This should concern all of us.....

I look forward to working with the FM board as well as the general membership in 2017.

--- Jeff Self, January 2017

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## Short bios of FMCC officers and directors:

Because several of our officers are new to the FMCC board this year, we will repeat from the last newsletter, the short biographical descriptions of all our officers:

**Don Bray** is a mineral collector and longtime member of the Colorado Chapter.

**David Bunk** is a mineral dealer, David Bunk Minerals, and has been the current FMCC representative to the Denver Council.

**Larry Havens** is a mineral collector, DMNS volunteer, and has served in numerous positions on the Denver Show Committee.

**Bob Hembree** is a collector and mineral dealer, 0 Dark 30 Boys Minerals, Bailey, Colorado.

**Mark Jacobson** is a retired geologist, mineral collector, and is the former (2014-16) FMCC President.

**Alan Keimig** is a mineral collector, DMNS volunteer, and is the past and current FMCC Secretary.

**Peter Modreski** is a geochemist at the USGS, a past FMCC president, and current newsletter editor.

**Ed Pederson** is a mineral collector and a longtime member of the FM Colorado Chapter.

**Jeff Self** is a field collector, dealer (Self-a-Ware Minerals) and Curator of Geology at the Sherman Dugan Museum of Geology, San Juan College, Farmington, New Mexico. Jeff and his wife Donna have been in charge of FMCC's Oral History of Colorado Mining project.

**Gloria Staebler** is the owner and editor of Lithographie, LLC, publisher and seller of mineralogical books, including the Mineral Monograph series. She also operates the Lithos retail shop for minerals and mineralogical books at 5695 Yukon St., Arvada CO.

## Denver Gem & Mineral Show Mini Report - 50th Anniversary

The 50th Anniversary of the Denver Gem & Mineral Show occurs this year - 2017! The dates are September 15 - 17. The theme for the show is, appropriately, gold and silver! This will be a memorable and fantastic show with more than the usual activities planned. Every club member will want to be a part of it! I think the exhibits at the show are always beautifully done showcasing exquisite minerals. With gold and silver as the 2017 theme, this year's exhibits will be equally as wonderful or perhaps even better. The Show Chair is again the very capable, Lesley Sebol. If you wish to contact Lesley about ideas you have for the show, she can be reached at 720-999-1372 or lesleysebol@gmail.com.

In honor of the show's 50th anniversary, the Show Committee is making arrangements for a historical perspective of the show, which will be written by Mark Jacobson. We are sure everyone knows Mark. He is a well-known local geologist, author of the book *Antero Aquamarines* and many other articles about Colorado mineralogy, and a program speaker at numerous local club meetings. Mark has requested input from the local gem, mineral and fossil community about the show, particularly the early years. The historical perspective will be a booklet similar to the 2016 Denver Planner and will be distributed with an issue of the Mineralogical Record plus other means of distribution. If you have information that might be helpful to Mark, you may contact him at markivanjacobson@gmail.com or 377-255-0527.

There is, indeed, much planning that is necessary for a successful show in September, especially this year. The Show Committee meets at the Denver Museum of Nature and Science every month, except for December, February and July. Meetings commence at 7:30 p.m. Perhaps you would like to become more involved with the show. It's easy to do! Every club has a representative to the Show Committee. Just tag along with your club rep and come to a meeting. We will welcome you and you can serve as a Member At Large until you find the niche that fits your talents.

The volunteer signup sheets will be coming out soon so watch for them. A descriptive list of the jobs will be included. Be sure to sign up numerous times!

Respectfully submitted, Judy Knoshaug, Show Secretary

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## Addendum to "Perspective on Mineral Collecting" by Daniel E. Kile

I hope that you all had a chance to read Dan Kile's essay on "**The Changing Landscape of Mineral Collecting: A Colorado Perspective**", to which we posted a link in the last (November 2016) Colorado Chapter newsletter (and sent a paper copy to those of our chapter members who receive their newsletters by U.S. Mail). Dan's article originally appeared in the Jan.-Feb. 2016 Midwest Friends of Mineralogy Chapter newsletter, link [http://www.fommidwest.org/wp-content/uploads/2016/01/2016\\_mw\\_Jan-Feb-.pdf](http://www.fommidwest.org/wp-content/uploads/2016/01/2016_mw_Jan-Feb-.pdf). As you should have seen recently, the article was reprinted in the January, 2017 National FM newsletter, pp. 10-18. (All Chapter members should be receiving, by email, a copy of the National newsletter. It is also available on the National FM website, <http://www.friendsofmineralogy.org/>, though as of this writing (Jan. 5), the January newsletter has not yet been posted.)

Dan has now also written an addendum to this essay: "**The Future of Field Collecting in the United States: Repercussions from the Prospector's Show**". It appears on pp. 18-21 of the National January newsletter, immediately following the reprint of his first article. I likewise encourage everyone to read this article of Dan's, if you have not already done so.

## Postscripts to the National FM Newsletter: Election Ballot and General Membership Meeting

Allow me to just put in two reminders: Page 5 of the January National FM newsletter contains a ballot for election of National Directors of FM (all members elect the Directors; the Directors elect the officers when they meet in Tucson). Please remember to return this ballot as instructed to FM National President Clyde Spencer, by email or U.S. Mail.

Secondly, as noted on page 1 of the National newsletter and also in Jeff Self's message from the President in this newsletter, all are invited to attend FM's general membership meeting and social get-together, Tuesday, Feb. 7, 4-6 p.m., to be set up in a tent outside the Hotel Tucson City Center, 475 N. Granada Ave.

## ***Notes about FM this month: 2017 Dues are Due!***

***Annual Dues to Friends of Mineralogy, Colorado Chapter*** are \$13.00; this includes membership in the national organization, Friends of Mineralogy, Inc.. New members are *always* welcome! To pay dues, mail a check for \$13 to FM-Colorado Chapter, P.O. Box 234, Arvada, CO 80001-0234; please include your name, email address and mailing address; or pay in person at one of our meetings. All our newsletters and mailings are normally sent by email, unless the member is unable to receive them that way. If you are uncertain about your membership status, please contact our Treasurer, Gloria Staebler, [gastaebler@aol.com](mailto:gastaebler@aol.com), 303-495-5521. *Now* is the time to pay your dues for 2017!

***See our Colorado Chapter website:*** <http://friendsofmineralogycolorado.org/>

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### ***Dates for 2017 FM Colorado Chapter activities:***

Meetings are normally held at 7:30 p.m. on the 2<sup>nd</sup> Thursday of alternate (odd-numbered) months, at the VIP Room in the Denver Museum of Nature and Science. The dates are sometimes shifted in September and November so as not to conflict with the Denver Gem & Mineral Show and the New Mexico Mineral Symposium. Visitors are *always* welcome at our meetings!

Meeting dates for 2017:

**Jan. 12, FM meeting**

**Mar. 9, FM meeting**

**May 11, FM meeting**

**May 13, FM Silent Auction**, Clements Community Center, Lakewood

**Sept. 7, 14, or 21, FM meeting** (*date to be determined*)

**Sept. 15-17, Denver Gem and Mineral Show**; 2017 show theme, “Gold and Silver” (50<sup>th</sup> anniversary)

**Nov. 16, FM meeting**

### **Friends of Mineralogy, Colorado Chapter, 2017 officers**

<b>President:</b>	Jeff Self, <a href="mailto:selfawareminerals@gmail.com">selfawareminerals@gmail.com</a>
<b>Vice President:</b>	Bob Hembree, <a href="mailto:rhembree@comcast.net">rhembree@comcast.net</a>
<b>Secretary:</b>	Alan Keimig, <a href="mailto:alan.keimig@gmail.com">alan.keimig@gmail.com</a> , 303-755-9604
<b>Treasurer:</b>	Gloria Staebler, <a href="mailto:gastaebler@aol.com">gastaebler@aol.com</a> , 303-495-5521
<b>Denver Museum N&amp;S Liaison:</b>	Alan Keimig, <a href="mailto:alan.keimig@gmail.com">alan.keimig@gmail.com</a> , 303-755-9604
<b>DG&amp;MS Council Trustee:</b>	David Bunk, <a href="mailto:dave@davebunkminerals.com">dave@davebunkminerals.com</a>
<b>FMCC Newsletter:</b>	Peter Modreski, <a href="mailto:pmodreski@aol.com">pmodreski@aol.com</a> , 303-202-4766
<b>Field trip planner</b> (not field trip leader):	unfilled
<b>FMCC Website:</b>	unfilled
<b>Postings for the FM national facebook page:</b>	unfilled
<b>At-large voting board members:</b>	

Larry Havens, [lghavens@aol.com](mailto:lghavens@aol.com) , 303-757-6577

Don Bray, [don-bray@copper.net](mailto:don-bray@copper.net) , 303-681-3646

Ed Pederson, [mineraljeep@aol.com](mailto:mineraljeep@aol.com)

Mark Jacobson, [markivanjacobson@gmail.com](mailto:markivanjacobson@gmail.com), 1-337-255-0627

Plus one unfilled position

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**Proposed collecting rules for invertebrate fossils on BLM land:** In December 2016 proposed regulations for lands under the jurisdiction of the Department of Interior (BLM, NPS, FWS, BR) were published in the Federal Register and became available for comments. Comments must be received by **Feb. 6, 2017**. See [http://rmfms.org/wp-content/uploads/BLM-RULE-CHANGE\\_2016.pdf](http://rmfms.org/wp-content/uploads/BLM-RULE-CHANGE_2016.pdf) for a very good one-page summary about this written by Mike Nelson, of Colorado Springs; the 56-page Federal Register document is at <https://www.federalregister.gov/documents/2016/12/07/2016-29244/paleontological-resources-preservation>; see especially the section defining “Casual Collecting”, p. 20-22, which appears to put a great many restrictions and limitations on what would constitute “casual” collecting. Similar to what mineral collectors are facing... .

**Calendar of coming events:**

**Mon., Jan. 9,** 7:00 p.m., at the monthly DREGS (Denver Region Exploration Geologists Society) meeting, “**Footprints across the southern Balkans: Discovery of the Cukaru Peki Cu-Au deposit, Serbia, and other observations on exploration in former Yugoslavia**”, by Vertrees M. ‘Mac’ Canby. All are welcome; 241 Berthoud Hall, Colorado School of Mines campus; social hour at 6:00, program at 7:00.

**Tues., Jan. 10,** 10:30 a.m., the USGS Rocky Mountain Science Seminar series begins with “**Constraints on climate and the carbon cycle during the early evolution of animals**”, by Kristin Bergmann, Massachusetts Institute of Technology. Visitors are welcome; in the Building 25 auditorium (enter the Federal Center at the main gate, Gate 1, on Kipling St.; park east of building 25 and use building entrance E-14).

**Thurs., Jan. 12,** 7:00 p.m., The Friends of the Colorado School of Mines Geology Museum's "First Thursday" lecture series will begin 2017 on 12 January (yep, the 2nd Thursday of the month!) on the CSM campus in the Ben H. Parker Student Center, Ballroom E, Maple Street, Golden, CO 80401. Socializing begins at 6:30 PM and the lecture will start at 7:00. Admission is free and all are welcome. The guest speaker will be Dr. Gavin Hayes, Research Geophysicist, USGS National Earthquake Information Center, “**Earthquakes and Earthquake Response in the 21st Century**”.

**Thurs., Jan. 12,** 7:30 p.m., at the bimonthly meeting of the Colorado Chapter, Friends of Mineralogy, “**Minerals of the Leonard mine, Butte, Montana**”, by Michael J. Goble. Denver Museum of Nature & Science, VIP Room. All are welcome.

**Thurs., Jan. 19,** 4:00 p.m., Van Tuyl Lecture Series at Colorado School of Mines, “**Gold deposits in metamorphic rocks: why are we getting more confused?**”, by Richard Goldfarb, CSM. Berthoud Hall Room 241, all are welcome.

**Thurs., Jan. 19,** 7:00 p.m., monthly meeting of the Colorado Scientific Society, featuring a talk by Giff Miller, INSTAAR and Geological Sciences, University of Colorado, “**An Arctic perspective on 20th Century warming**”. At Shepherd of the Hills Church, 11500 W. 20th Ave., Lakewood. All are welcome. Social time 6:30, meeting begins at 7.

**Tues., Jan. 24,** 10:30 a.m., USGS Rocky Mountain Science Seminar series, “**How salty was the sea? Constraining seawater chemistry with ancient evaporites**”, by Clara Blättler, Princeton University. Visitors are welcome; in the Building 25 auditorium (enter the Federal Center at the main gate, Gate 1, on Kipling St.; park east of building 25 and use building entrance E-14).

**Thurs., Jan. 26,** 4:00 p.m., Van Tuyl Lecture Series at Colorado School of Mines, “**Differential zircon fertility, sedimentary recycling, and other problems for detrital zircon geochronology in provenance studies: Detrital monazite to the rescue!**”, by David Moecher, Univ. of Kentucky. Berthoud Hall Room 241, all are welcome.

**Fri.-Sat.-Sun., Feb. 24-26,** Gem and Mineral Show, sponsored by the **Denver Gem and Mineral Guild**; Jefferson County Fairgrounds, 10-6 Fri. & Sat., 10-5 Sun.; free admission.

**Sat.-Sun., March 4-5,** **Journey to the Jurassic – Exploring the Morrison Formation**, WIPS (Western Interior Paleontological Society) 10<sup>th</sup> Founders Symposium. Green Center, Colorado School of Mines campus, Golden.

**Fri.-Sun., Mar. 17-19,** “**Treasures of the Earth**” **Albuquerque Gem & Mineral Show and Rocky Mountain Federation of Mineralogical Societies Conference & Show**, NM State Fairgrounds; see <http://agmc.info/index.php?page=spring-treasures-of-the-earth> .

**Fri.-Sat.-Sun., Mar. 31-Apr. 2,** **Fort Collins Gem & Mineral Show**, sponsored by the Fort Collins Rockhounds Club, at the McKee 4-H Building, Larimer County Fairgrounds/The Ranch, I-25 exit 259. 4-8 p.m. Fri., 9-6 Sat., 10-5 Sun.

**Fri.-Sat.-Sun., Apr. 14-17,** **Colorado Mineral and Fossil Spring Show**, Crowne Plaza Hotel - Airport, 15500 E. 40th Ave. Denver, CO. See <http://www.rockygems.com/colorado-mineral--fossil-spring-show-2017.html> .

**Sat., May 13,** **Friends of Mineralogy, Colorado Chapter, Silent Auction**. Clements Community Center, 1580 Yarrow St., Lakewood CO, 12:00-4:00 (setup begins at 10:30 a.m., auction begins at 12:00, verbal auction 1:00, all tables will close by 3:00 p.m., checkout follows).

**Fri.-Sat.-Sun., June 2-4, Pikes Peak Gem & Mineral Show**, sponsored by the Colorado Springs Mineralogical Society. At Mortgage Solutions Financial Expo Center, 3650 N. Nevada Ave., Colorado Springs.

**Fri.–Mon., July 21-24, Gold and Silver Deposits in Colorado**, a symposium cosponsored by the Friends of the Colorado School of Mines Geology Museum and DREGS (Denver Region Exploration Geologists Society). “The event will feature two days of talks (July 22 - 23) and two days of field trips (July 21 and 24) to historic Colorado gold and silver mining areas.”

*For more lecture series during the year see:*

CU Geological Science Colloquium (Wednesdays, 4 p.m.) see <http://www.colorado.edu/geosci/colloquium.htm>

CSU Dept. of Geoscience Seminars (Fridays, 4 p.m.), see <http://warnercnr.colostate.edu/geo-news-and-events/departement-seminars>

Van Tuyl Lecture Series, Colorado School of Mines, (Tuesdays, 4 p.m.): [http://inside.mines.edu/GE\\_Lecture-Series](http://inside.mines.edu/GE_Lecture-Series)

Denver Mining Club (Mondays, 11:30), see <http://www.denverminingclub.org/>

Denver Region Exploration Geologists Society (DREGS; 1<sup>st</sup> Monday, 7 p.m.), <http://www.dregs.org/index.html>

Rocky Mountain Map Society (RMMS; Denver Public Library, Gates Room, 3<sup>rd</sup> Tuesday, 5:30 p.m.), <http://rmmaps.org/>

Western Interior Paleontology Society (WIPS; Denver Museum of Nature & Science, 1<sup>st</sup> Monday, 7 p.m.), <http://westernpaleo.org/> .

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**UPCOMING SCIENCE FAIRS – LOOKING FOR JUDGES:** Judges (and other types of volunteers too) are being sought for several school, regional, and state science fairs:

**Community Resources, Inc.**, can use more judges at several upcoming science fairs in Denver Public Schools. “We just received word that Southmoor Elementary (SE Denver ,which had 45 projects last year, has 180 projects this year. So we need more judges for its fair on **Tuesday, January 10th**. We also need more judges for Bryant Webster (NW Denver) on **Friday, January 13th** and for the DPS District Science Fair at DU on **Saturday, January 21st**.” These school fairs are in the mornings, approx.. 8 a.m. to noon. To volunteer, you may sign up online at <http://www.signupgenius.com/go/8050f4eada628a13-community> or, email or call Sue Edwards, Executive Director, Community Resources Inc., 720-424-6523, sue\_edwards@dpsk12.org .

**The 2017 Longs Peak Science and Engineering Fair** will be on **Tuesday, February 14**, at the Island Grove Event Center, 425 N. 15<sup>th</sup> Avenue, Greeley (shuttle service will be available from UNC). “We are anticipating higher numbers of grade 5-12 students than we’ve ever had before. Over 400 student researchers from Weld, Larimer, & Jackson County will compete for a chance to move on to state-level competition .The students will present their creative project ideas! Please share this message with anyone who might have an interest in helping with the event, check your schedules and ask for time off that day from your classes or work so that you can lend your expertise to judging and/or project inspections that day. Qualifications: Interest in youth STEM education is a must; a degree in a STEM field is NOT needed or required. Volunteers needed (training provided day of fair) include Project Board Inspectors, 7:15am – 9:00am; Morning Judges, 8:00am – 12:30pm; Afternoon Judges, 12:15pm – 5:00pm; All-Day Judges, 8:00am – 5:00pm. Volunteers may register at [www.lpsef.org](http://www.lpsef.org) .

**The 2017 Denver Metro Regional Science & Engineering Fair** will take place on the CU-Denver campus on **Friday, February 17**. “We are always looking for mentors, volunteers, and judges.” To register as a judge, see <http://denversciencefair.com/> . They ALSO need volunteers to help in advance on their Scientific Review Committee, as well as for Display and Safety, “Wayfinders”, and photographers—all this is on their web page.

**The 2017 Colorado State Science & Engineering Fair** “will be held on **Thursday, April 6** so mark your calendars now! We need you! Grand Awards Judging is an all-day event and judges need to be in attendance at the fair from 10 a.m. - 5:30 p.m.” To sign up as a Grand Award Judge (that’s the name for judges for the main competition) register online at <http://www.csef.colostate.edu/Judges.htm> . Volunteers are also needed for numerous categories of help in addition to judging; see their website for this too.